Climate Change and Health

Understanding the Ripple Effects on Communities and Care

United Hospital Fund

Improving Health Care for Every New Yorker

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Acknowledgments

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United Hospital Fund

Improving Health Care for Every New Yorker

UHF works to build an effective and equitable health care system for every New Yorker. An independent, nonprofit organization, we are a force for improvement, analyzing public policy to inform decision-makers, finding common ground among diverse stakeholders, and developing and supporting innovative programs that improve health and health care. We work to dismantle barriers in health policy and health care delivery that prevent equitable opportunities for health. For more on our initiatives and programs, please visit our website at www.uhfnyc.org, and follow us on X (formerly Twitter) at @UnitedHospFund.

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Introduction

In recent decades, the pace of climate change has increased, contributing to more frequent extreme weather events, such as summer heatwaves and coastal storms, that increase risks to people's safety and livelihoods. In New York State, the effects of climate change are already being felt through rising temperatures and increased flood risks. The number of days of extreme heat over 90°F per year has increased from approximately 11 days in the early 2000s to around 15 days today, while extreme precipitation in the Northeastern U.S. has increased 71% since the 1950s.

These shifts in the climate can affect health in direct ways, sometimes leading to acute injuries or creating weather conditions that impair the body's ability to regulate itself. For example, periods of extreme heat can increase the likelihood of heat stroke or even death. Moreover, extreme weather events and gradual environmental change can have an indirect impact on the social drivers of health, which include stable housing, food, energy, transportation, and other essential resources. Climate change is associated with health risks through interconnected environmental and social pathways for the general population and for certain groups in particular, including communities already facing socioeconomic challenges and vulnerable individuals (e.g., due to pregnancy, chronic health conditions, or age).

To better understand the current and projected impacts of climate change on health, United Hospital Fund (UHF) partnered with Boston Consulting Group (BCG) to:

1. Track how different aspects of the climate have changed over time in the United States, New York State, and New York City.

2. Estimate how these climate events may affect outcomes related to health and the social drivers of health.

This analysis leverages historical climate and health data, research findings from scholarly articles, and climate models to better understand the effects of climate change on both individual and community health and well-being. Insights from key informant interviews helped shape the suggested interventions aimed at reducing potential impacts and supporting resilience. This moment presents an opportunity not only to protect health, but also to enhance community trust, improve operational efficiency of health care systems, and preserve workforce productivity and household income.

Key Findings

EVIDENCE OF A CHANGING CLIMATE

In New York City, the number of extreme heat days is projected to approximately **double from 17 days in 2005 to between 35 and 45 days in 2050**.

Canada's climate change-driven wildfires in 2023 caused $PM_{2.5}$ concentration in the Northeastern U.S. to **exceed World Health Organization (WHO) safety guidelines 17x**.

CLIMATE-LINKED HEALTH IMPACTS

In New York State, the heat-exacerbated mortality rate is **2x higher than the population average for adults 65+** and 5x higher for adults 85+.

Black New Yorkers in New York City died at 2x the rate of white New Yorkers due to directly attributed heat deaths from 2013 to 2022.

By 2050, New York State is projected to see over **22,000 new Lyme disease cases**, accounting for **30% of U.S. incidence**, driven by warmer, wetter conditions that are favorable for disease-carrying vectors.

Across the U.S., **up to 680,000 additional people may experience asthma** associated with air pollution in 2050 relative to 2025, exacerbated by climate events like acute wildfires and chronic, longer pollen seasons, which contribute to worsening air quality.

RIPPLE EFFECTS BEYOND PHYSICAL HEALTH

Extreme weather events have **destroyed housing, interrupted electricity access, and caused agricultural losses** in New York State.

Based on current costs in 2025, the ripple effects of climate change in 2050 are estimated to include up to **$45 billion in health care costs** and **$250 billion in lost wages** across the U.S.

Key Definitions

- **Extreme heat days** are days when temperatures exceed 90°F, which approximately corresponds to the 95th percentile of daily temperatures. For historical data, the temperature was defined by the heat index (or apparent temperature), which combines the air temperature (or measured temperature) and relative humidity to determine how a human feels or perceives the temperature. Future projections were based on the modeled maximum daily air temperature.
- **Heat-related illnesses** are conditions that result from the body's inability to cope with heat. Some common examples include heat stroke, heat exhaustion, heat cramps, and hyperthermia. Many heat-related illnesses lead to a visit to the emergency department (ED). There are multiple ICD-10 codes that can indicate a case of heat-related illness, so different data sources may count heat-related illnesses differently.
- **Directly attributed heat deaths** are cases in which the recorded cause of death is explicitly listed as heat-related in the death certificate. They are also known as heat-stress deaths or heat-stroke deaths and occur when heat-related illnesses lead to death. They are analyzed using the following ICD-10 codes: T67 (effects of heat and light) and X30 (exposure to excessive natural heat).
- **Heat-exacerbated deaths** are cases in which the death is not directly caused by heat-related illnesses but rather by an existing chronic condition that is aggravated by extreme heat conditions. For example, chronic obstructive pulmonary disease (COPD) or cardiovascular disease (CVD) are both chronic conditions that can be worsened by heat and indirectly lead to death. Also known as excess mortality, heat-exacerbated deaths are estimated by drawing statistical relationships between all-cause mortality, weather conditions, and sociodemographic factors.
- **RCP** stands for Representative Concentration Pathways, which are standardized models used to project future climate conditions based on varying assumptions for inputs that drive climate change, including greenhouse gas emissions and socioeconomic developments.
  - **RCP4.5 scenario** is a moderate-emissions scenario that assumes around 2-3°C of global warming by 2100 and is the assumed trajectory based on existing trends.
  - **RCP8.5 scenario** is a high-emissions scenario that assumes around 4-5°C of global warming by 2100 and is the assumed trajectory in the absence of policies to manage climate change.
  - More details on the underlying assumptions for each of these scenarios can be found in the appendix.
- **Social drivers of health** are conditions in the environments where people are born, grow, live, work, and age that affect health and quality of life. They can be grouped into five domains: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context.

Climate change and health are interconnected

The causal pathways between climate events, health outcomes, and social drivers of health are numerous and complex, but evidence increasingly suggests that climate and health are closely connected.

This analysis leverages existing climate models, projections, and literature to estimate past and future health trends in the United States, New York State, and New York City. Topics covered in this analysis are highlighted orange in the figure.

Figure 1

Climate events and resulting impacts on health outcomes and social drivers of health

Climate Events	Health Outcomes	Social Drivers of Health
Increased extreme heat days and rising temperatures	Heat-related and exacerbated illnesses, e.g., heat stroke, cardiovascular disease (CVD)	Housing insecurity
Increased extreme precipitation days, storms, and floods	Respiratory illnesses, e.g., asthma, chronic obstructive pulmonary disease (COPD)	Food insecurity
Poor air quality and wildfires	Vector-borne diseases, e.g., Lyme disease, West Nile Virus	Energy insecurity
Drought	Mental health, e.g., anxiety, post-traumatic stress disorder (PTSD)	Economic stability
Increased other extreme weather events, e.g., tornadoes, blizzards, polar vortexes	Birth outcomes, e.g., low birth weight, preterm birth	Transportation access
	Waterborne illnesses	Education access
	Acute injury	

Since the 80s, NY has experienced 6 additional extreme heat days per year

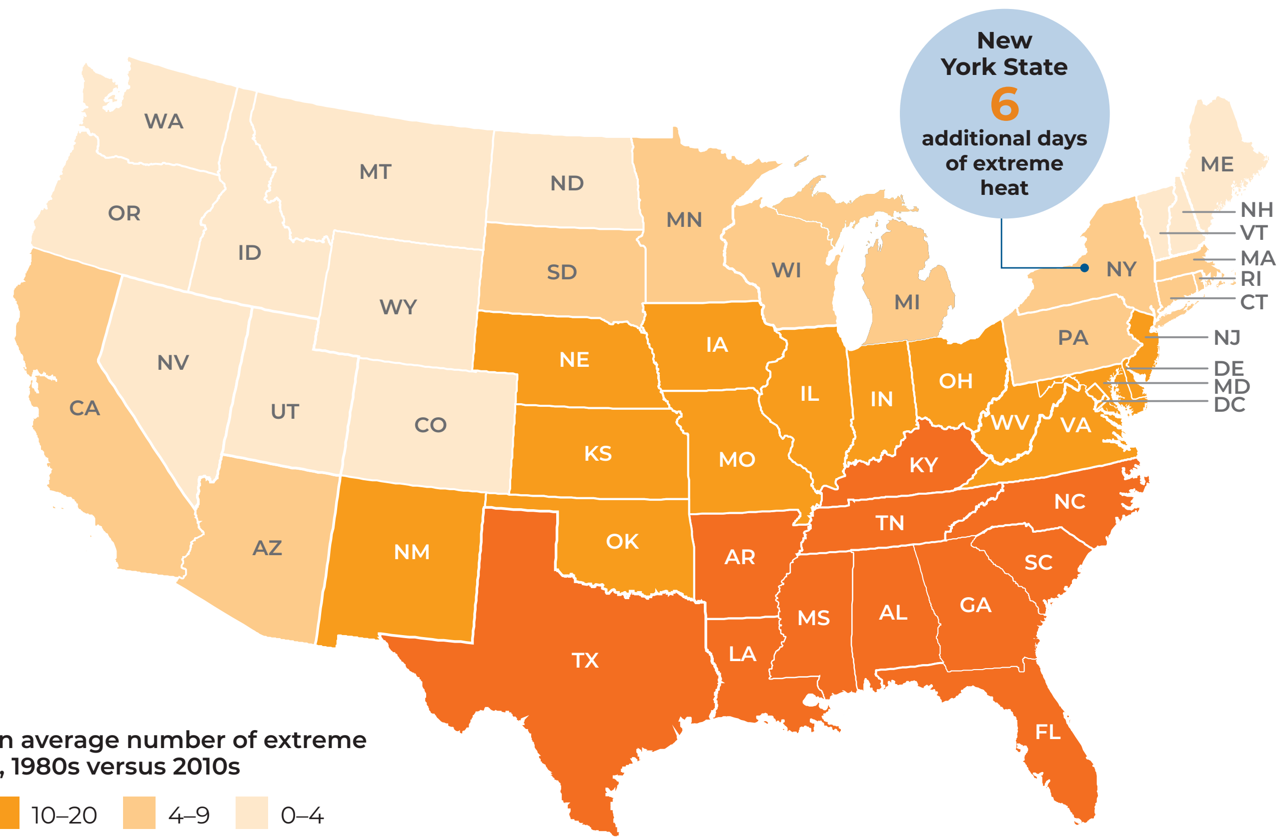
Temperatures in the U.S. have risen significantly in recent decades, with every state experiencing an increase in extreme heat days when comparing the average annual number from the 1980s to the 2010s. This historical trend corresponds to a projected increase of between 45% and 60% in annual extreme heat days in the U.S. when averaging across all 50 states, from 50 days in 2005 to 70 (RCP4.5 scenario) to 80 (RCP8.5 scenario) days in 2050.[1]

While southeastern states have experienced the largest increase (up to a month more extreme heat days in the 2010s versus the 1980s), New York State has also seen a notable rise, with 6 additional extreme heat days per year. Moreover, the average annual temperature in the U.S. has exceeded the long-term average every year since 1997.[2] When comparing the 2020s to the 1960s, heatwaves have occurred 3 times as frequently and lasted 1.4 times longer.[3]

These rising temperatures can affect health outcomes directly, including on hot days when the risk of heat-related illnesses may be heightened, and indirectly, by placing additional stress on factors like housing, infrastructure, agriculture, and access to energy.

Figure 2

National map of extreme heat days, 1980s versus 2010s



This figure was generated using historical data from the Centers for Disease Control and Prevention's National Environmental Public Health Tracking Network data explorer.

SOURCES:

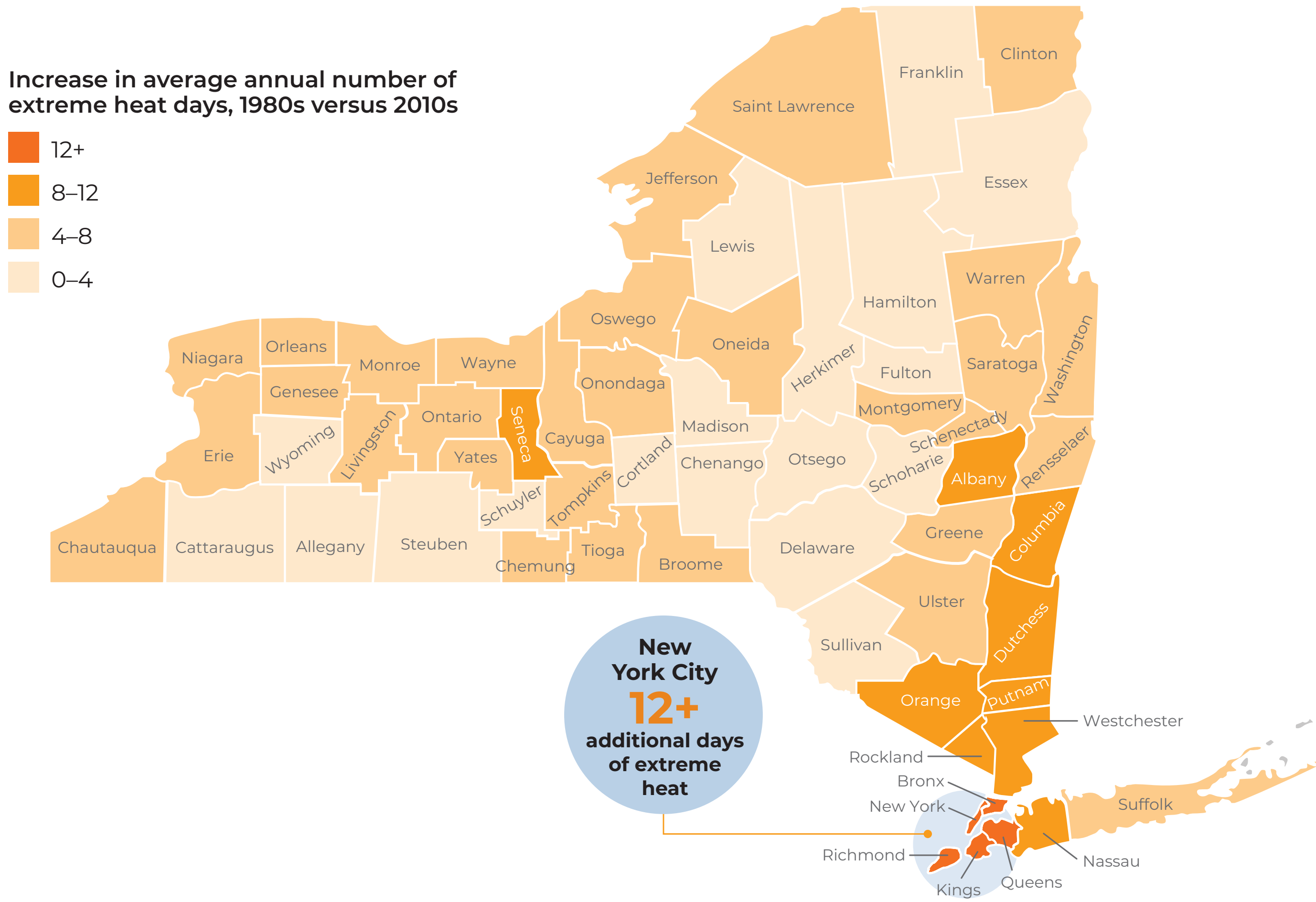
1. National Integrated Heat Health Information System, The Climate Explorer.
2. Environmental Protection Agency, Climate Change Indicators, Weather and Climate, U.S. and Global Temperature.
3. Environmental Protection Agency, Climate Change Indicators, Weather and Climate, Heat Waves.

NYC has historically experienced 12+ additional extreme heat days per year

In New York State, the rise in the annual average of extreme heat days from the 1980s to the 2010s varies significantly by county. The five boroughs of New York City have experienced an increase in extreme heat days (12+ days) that is more than double the state's average increase (6 days), primarily due to the urban heat island effect. This effect is driven by a lack of green space (such as trees, grass, and shrubs) and a higher concentration of impervious surfaces that hold heat (including asphalt, concrete, astroturf, and hard-packed dirt).[1] These factors can increase temperatures by up to 2°F on a block-to-block basis[1]; in lower-income neighborhoods, temperatures can be 6°F hotter during the day and remain 4°F hotter after sunset.[2]

Figure 3

New York State map of extreme heat days, 1980s versus 2010s



This figure was generated using historical data from the Centers for Disease Control and Prevention's National Environmental Public Health Tracking Network data explorer.

SOURCES:

1. The NYC Environment & Health Data Portal, "The urban heat island effect in NYC." (2021)
2. Donova, "NYC Heat Mapping Study Finds Higher Temps in Lower-Income Neighborhoods." (2022)

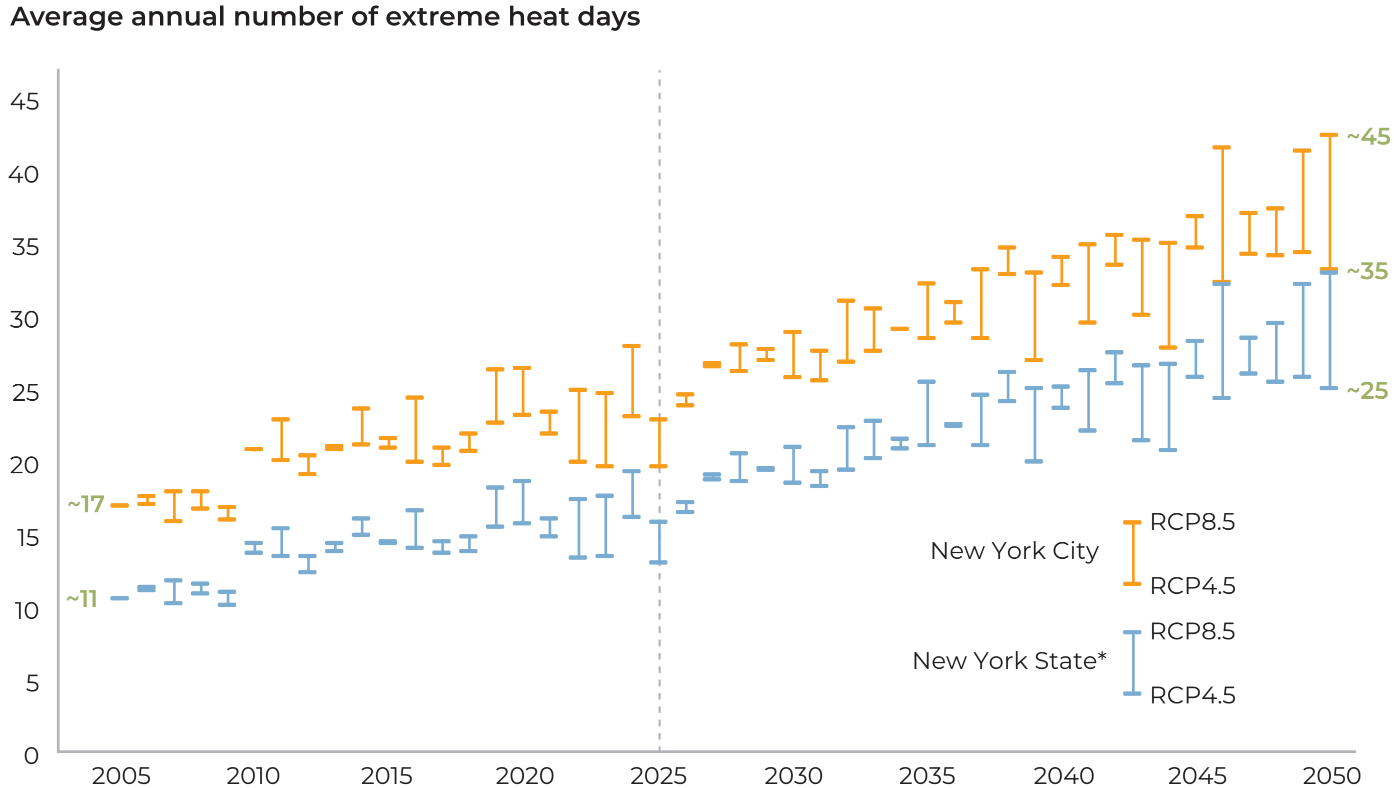
NY is projected to experience ~15-25 additional extreme heat days per year by 2050

In New York State, the number of extreme heat days averaged across the 62 counties is projected to rise between 120% and 190%, from 11 days in 2005 to 25 (RCP4.5 scenario) to 35 (RCP8.5 scenario) total days in 2050.

Driven in part by the urban heat island effect, New York City is projected to experience 25% to 40% more extreme heat days when averaging across the 5 counties, compared to the state average for each year between 2025 and 2050. This could mean an increase of between 95% to 150%, from 17 days in 2005 to 35 (RCP4.5 scenario) to 45 (RCP8.5 scenario) days in 2050. Of all 62 counties, Richmond County (Staten Island) could experience the highest number of extreme heat days in 2050, with projections between 39 (RCP4.5 scenario) and 48 (RCP8.5 scenario) days.

Figure 4

Projected increase in extreme heat days in New York State and New York City, 2005 to 2050



This figure was generated using a climate model from the National Integrated Heat Health Information System.

NOTE:

* New York State is inclusive of New York City. The New York State number is calculated by determining the projected annual number of extreme heat days for each of New York State's 62 counties and taking the population-weighted average across all of them. The New York City number is calculated by determining the projected annual number of extreme heat days for each of New York City's 5 counties and taking the population-weighted average across them. Thus, the projected numbers for New York City are higher than that of New York State because New York City on average experiences more extreme heat days than the entire state on average.

Demographic disparities persist for directly attributed heat deaths in NYC

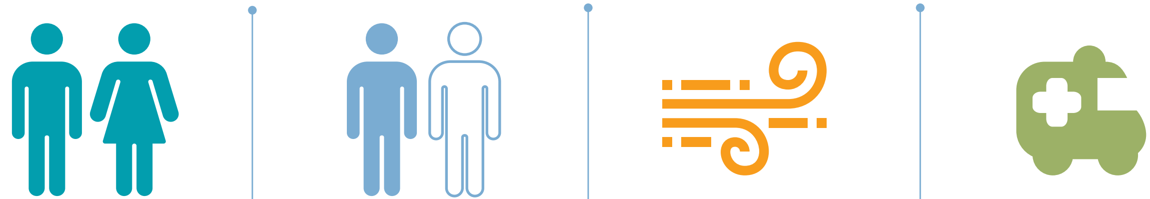
Extreme heat can affect the body's ability to regulate its temperature, potentially leading to conditions like heat exhaustion and hyperthermia, which in some cases can culminate in directly attributed heat deaths. Notably, the average annual rate of directly attributed heat deaths in the U.S. has more than doubled since the early 2000s, from 0.21 per 100,000 in 2001-2006 to 0.51 per 100,000 in 2019-2024.[2]

Certain groups are disproportionately affected. An analysis of the demographic characteristics of directly attributed heat deaths in New York City from 2013 to 2022 revealed disparities across several factors, including sex, race, age, access to air conditioning, and the presence of chronic health conditions. These disparities suggest that directly attributed heat deaths are linked to socioeconomic conditions. Interventions could consider prioritizing communities experiencing the greatest challenges, including those that have experienced longstanding barriers to resources and opportunities.

Figure 5

Directly attributed heat deaths in New York City, 2013 and 2022

For directly attributed heat deaths in New York City between 2013 to 2022,[1]



4x male compared to female New Yorkers died

2x Black compared to white New Yorkers died

100% of those who died at home had no air conditioning, or the air conditioning was not working or in use

89% had at least one chronic health condition

SOURCES:

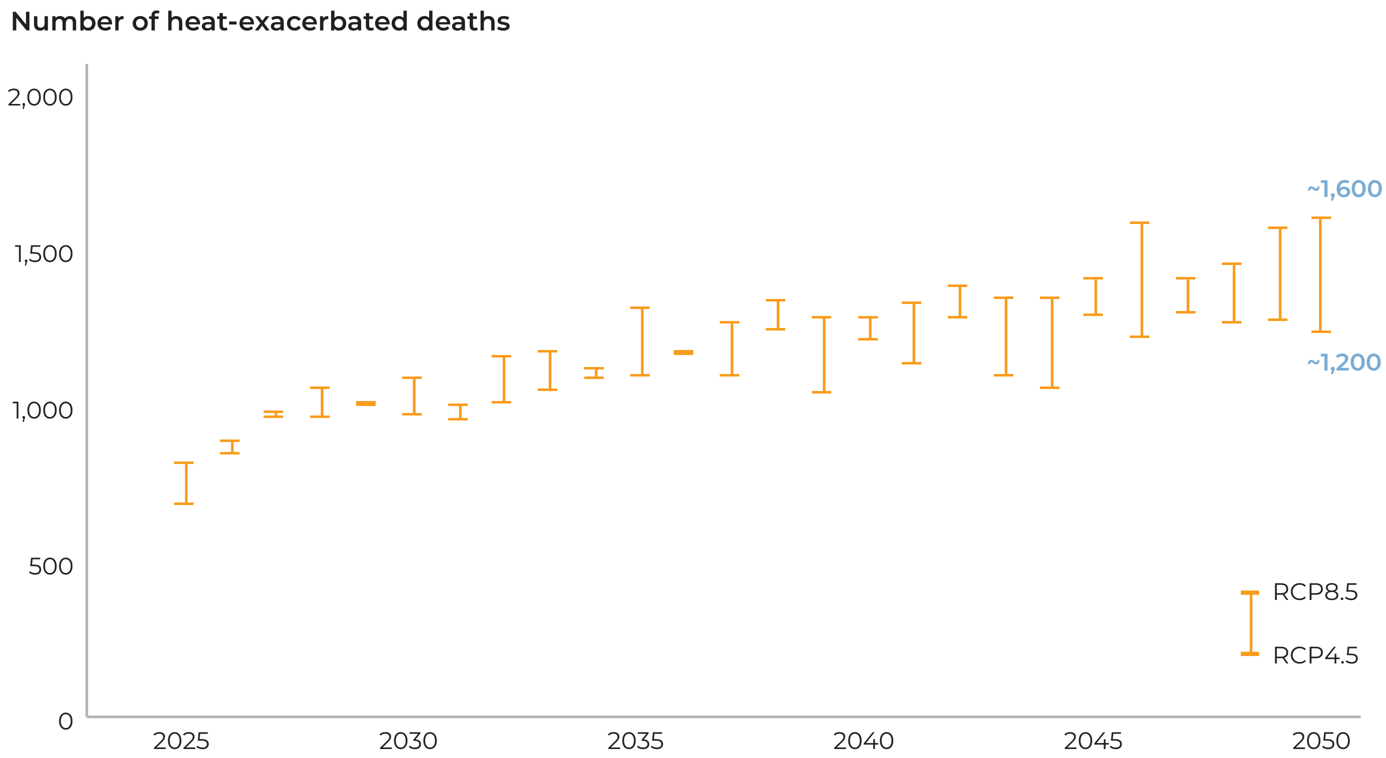
1. The NYC Environment & Health Data Portal, "2024 NYC Heat-Related Mortality Report." (2025)
2. CDC WONDER, Multiple Cause of Death.

Heat-exacerbated deaths in NY expected to double by 2050

Extreme heat may aggravate existing chronic health conditions and contribute to an increase in heat-related health risks and deaths. In New York State, the number of heat-exacerbated deaths is projected to double to between 1,200 (RCP4.5 scenario) and 1,600 (RCP8.5 scenario) in 2050, with underlying COPD and CVD as significant comorbidities. Cumulatively, between 2025 and 2050, New York State is projected to see over 30,000 excess deaths, representing over 600,000 years of life lost. Notably, New York City is projected to account for 75% of heat-exacerbated deaths in New York State in 2050. Nationwide, the cumulative number of excess deaths between 2025 and 2050 is estimated to reach up to 550,000.

Figure 6

Projected increase in heat-exacerbated deaths in New York State, 2025 to 2050



This figure was generated by estimating historical numbers based on literature and data sources and doing a future projection using population projections and a climate model from the National Integrated Heat Health Information System. A full source list and explanation of the methodology can be found in the appendix.

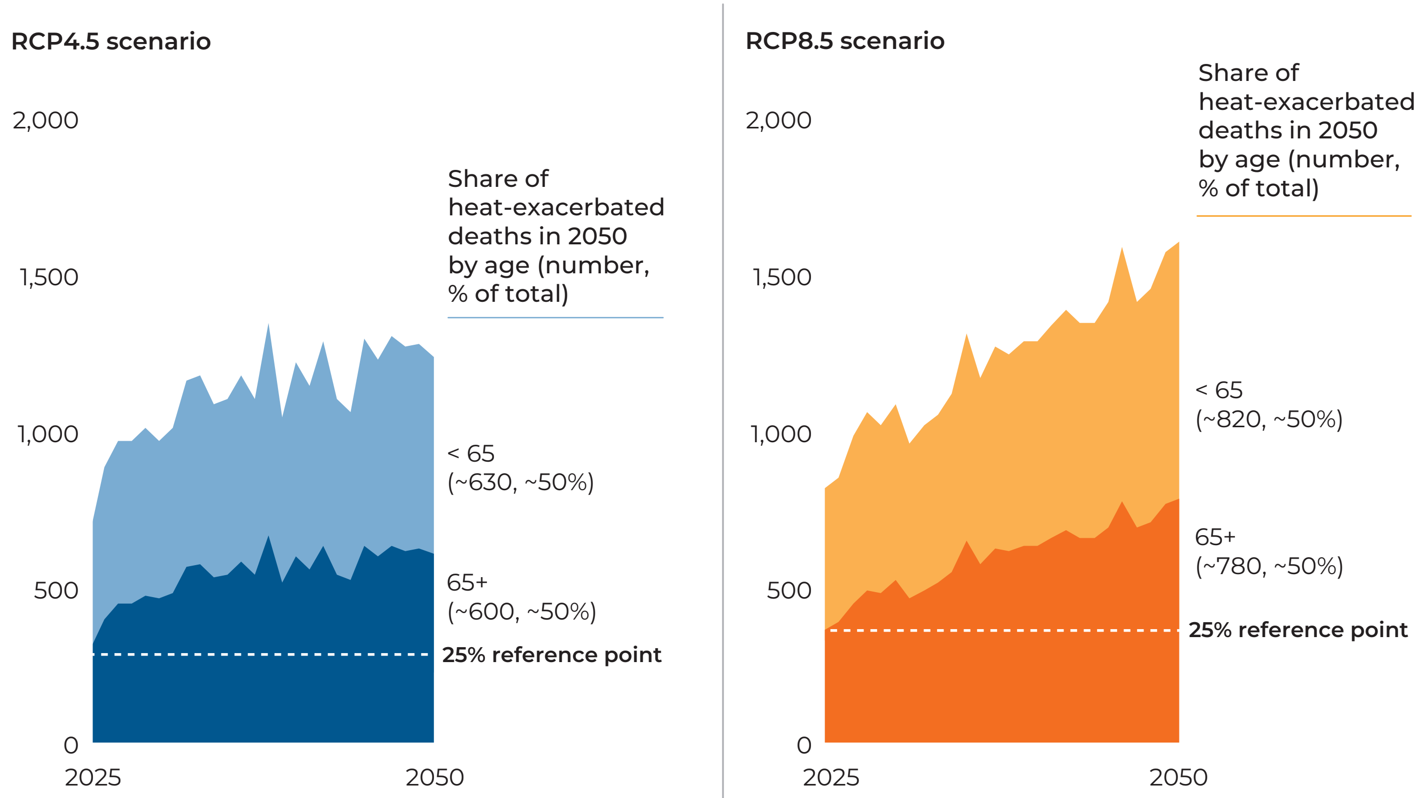
Adults 65+ in NY are projected to account for less than 25% of the population but represent over 50% of heat-exacerbated deaths in 2050

Older adults are especially susceptible to heat-exacerbated death. Currently, adults ages 65 and older in New York State account for only 20% of the population but represent 40% of heat-exacerbated deaths. Their heat-exacerbated mortality rate is over twice the population average, and for adults ages 85 and older, their rate is five times higher. This age-related disparity is projected to increase over time; by 2050, adults 65 and older in New York State will account for less than 25% of the population but could represent over 50% of heat-exacerbated deaths, with slight variations between the RCP 4.5 and RCP 8.5 scenarios. Similar trends are projected for both the U.S. and New York City.

Figure 7

Projected increase in heat-exacerbated deaths disaggregated by age in New York State, 2025 to 2050

Number of heat-exacerbated deaths



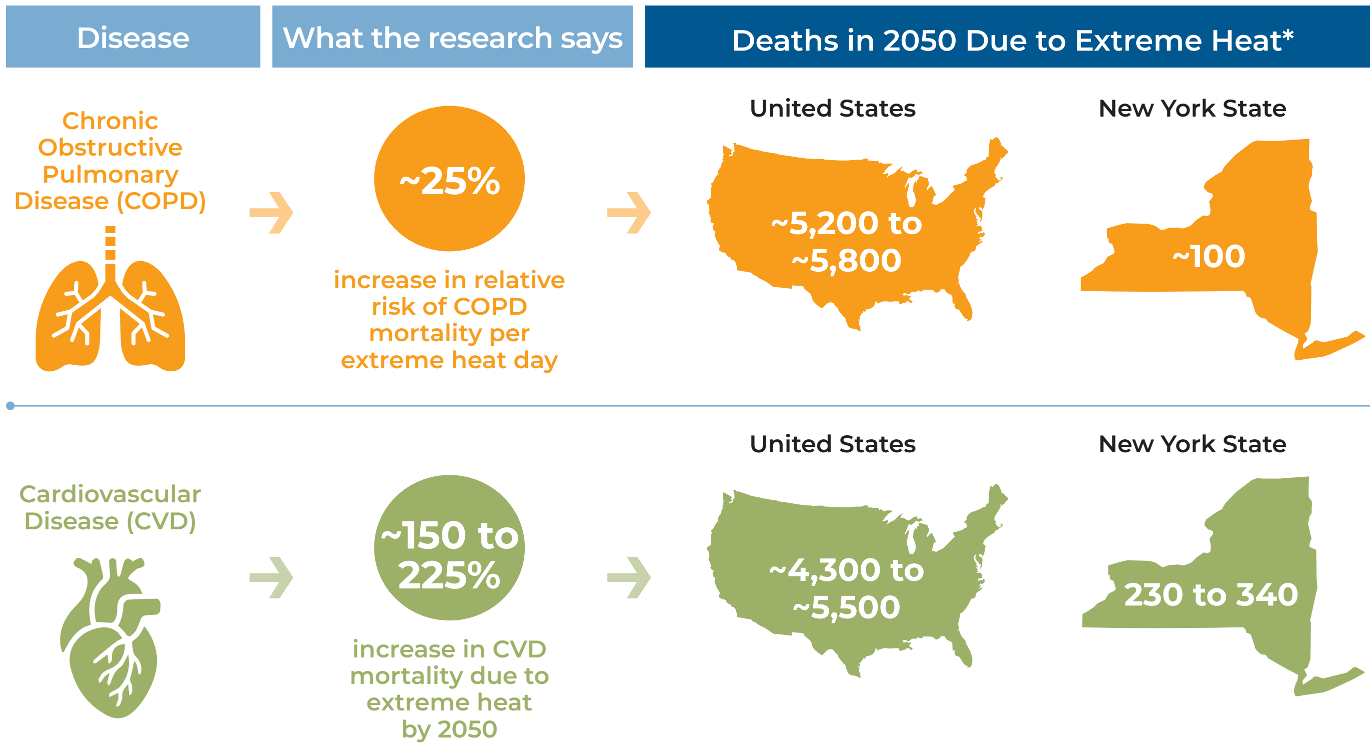
This figure was generated by estimating historical numbers based on literature and data sources and doing a future projection using population projections and a climate model from the National Integrated Heat Health Information System. A full source list and explanation of the methodology can be found in the appendix.

COPD and CVD are two leading causes of heat-exacerbated mortality

COPD and CVD are two chronic health conditions that may be affected by extreme heat. Research suggests that high temperatures can place additional strain on the lungs and heart, potentially increasing health risks for individuals with these conditions. An estimated 9,500 to 11,300 deaths from COPD and CVD are projected to occur in the U.S. in 2050 that may be associated with the impacts of extreme heat.

Figure 8

Projected heat-exacerbated deaths due to COPD and CVD in the U.S. and New York State, 2050



This figure was generated by applying multipliers defined in literature sources and doing a future projection using population projections and a climate model from the National Integrated Heat Health Information System. A full source list and explanation of the methodology can be found in the appendix.

NOTE:

* For each range of values presented, the smaller number represents the estimate based on the RCP4.5 scenario, and the larger number represents the estimate based on the RCP8.5 scenario. For COPD in New York State, both the RCP4.5 scenario and the RCP8.5 scenario yielded an estimate of 100.

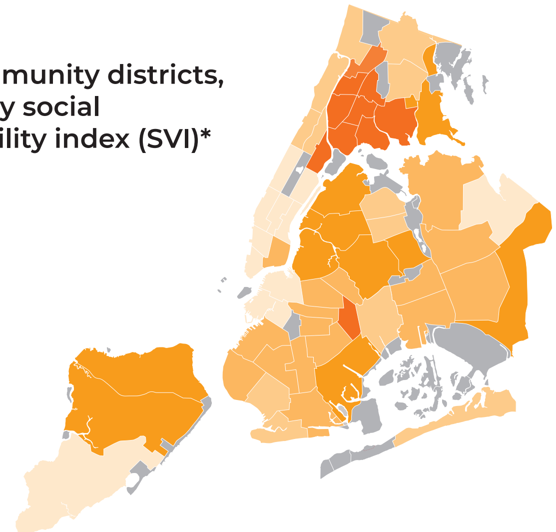
NYC's socially vulnerable neighborhoods experience the highest rates of heat-related ED visits

New York City's most socially vulnerable communities (as defined by the social vulnerability index) experience higher rates of emergency department (ED) visits for heat-related illnesses. Community districts in the top quintile of social vulnerability experience the highest average rate of ED visits for heat-related illnesses—a rate that is over 60% higher than that of districts in the bottom quintile of social vulnerability. Furthermore, as temperatures rise, communities with higher levels of social vulnerability may experience a greater increase in ED visits for heat-related illnesses. Factors used to determine the social vulnerability of communities include housing quality (such as dwelling type and level of crowding), health insurance coverage, and transportation options.

Figure 9

New York City map of social vulnerability index and ED visits for heat-related illnesses, 2018 to 2022

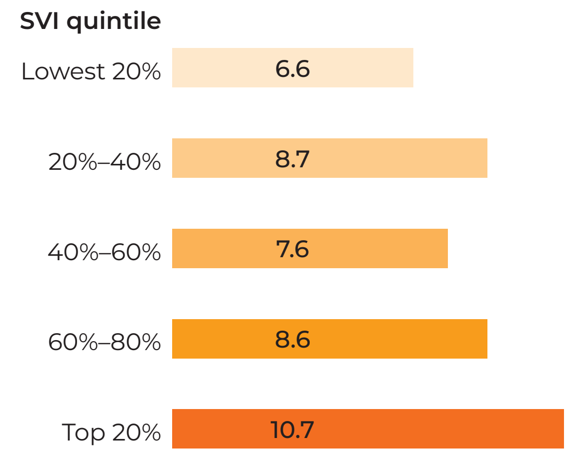
NYC community districts, graded by social vulnerability index (SVI)*



Least vulnerable (SVI in bottom 20%)

Most vulnerable (SVI in top 20%)

Average annual rate (per 100,000) of ED visits for heat-related illnesses**



The map was generated using the Social Vulnerability Index from the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry. The bar chart was generated using data from the data explorer of the NYC Environment & Health Data Portal (Weather-related illness, Heat stress: 5-year emergency department visits).

NOTES:

* The social vulnerability index measures the relative vulnerability of communities based on demographic and socioeconomic factors that affect their ability to respond to natural disasters like hurricanes, human-caused hazards like chemical spills, and public health emergencies like COVID-19. Variables used to determine overall vulnerability are grouped into the following four major areas: socioeconomic status, household characteristics, racial and ethnic minority status, and housing type and transportation.

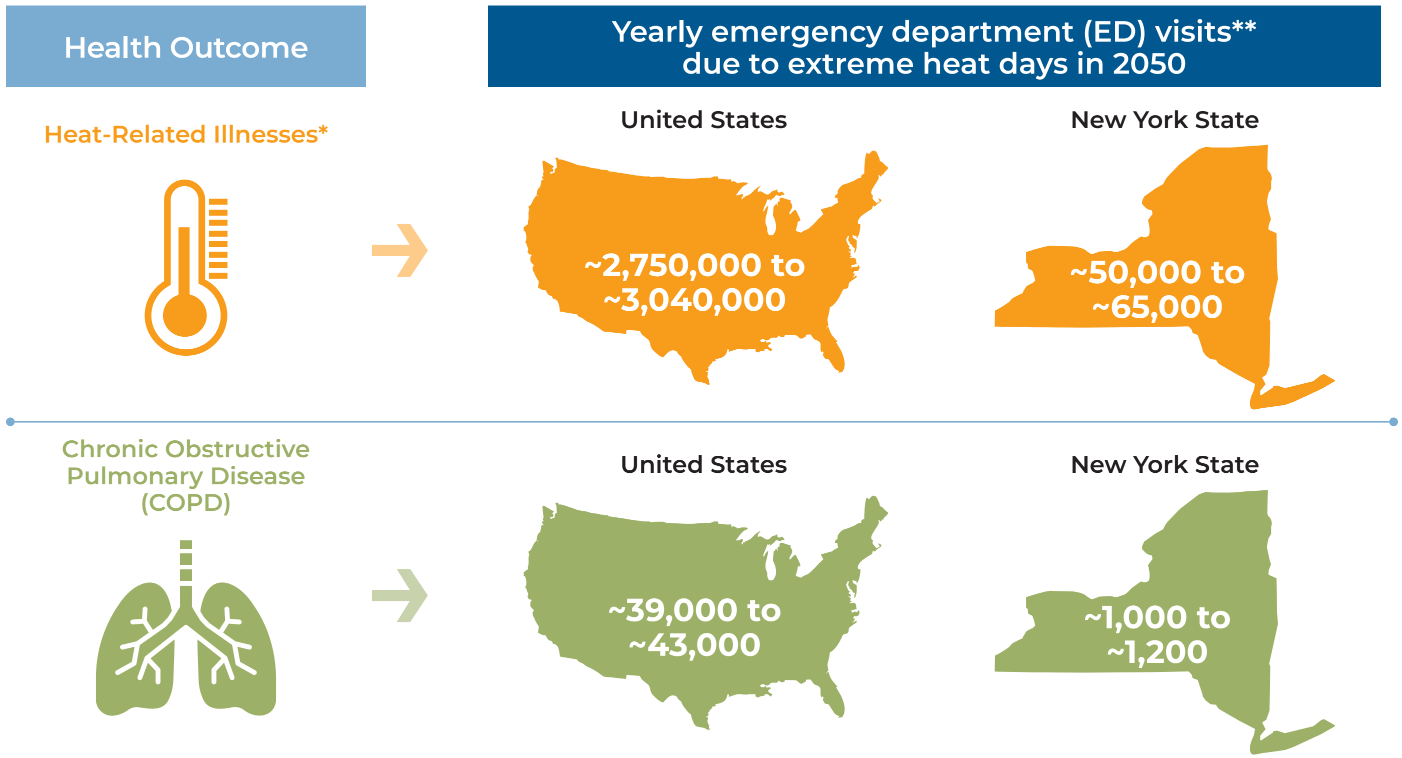
** The count of ED visits for heat-related illnesses is defined as the number of NYC residents treated in an NYC ED between 2018 and 2022 and during the months of May through September, for the following ICD-10 codes: T67 (effects of heat and light), X30 (exposure to excessive natural heat), and X32 (exposure to sunlight). To calculate each annual rate, the count for each year was divided by the corresponding population estimate from New York City Department of Health and Mental Hygiene and then adjusted to be expressed as cases per 100,000 residents. The average was then taken of the five annual rates.

High temperatures drive ED visits on extreme heat days, when utilization is already high

On extreme heat days, data suggest an increase not only in directly attributed heat deaths and heat-exacerbated deaths, but also in ED visits for heat-related illnesses and COPD. Nationally, projections estimate there could be over 3 million ED visits for heat-related illnesses and up to 43,000 for COPD in 2050. These potential increases in demand may place additional pressure on the ED and health care system.

Figure 10

Projected ED visits on extreme heat days for heat-related illnesses and COPD in U.S. and New York State, 2050



This figure was generated by estimating historical numbers based on literature and data sources and doing a future projection using population projections and a climate model from the National Integrated Heat Health Information System. A full source list and explanation of the methodology can be found in the appendix.

NOTES:

* Heat-related illnesses are defined as the following ICD-10 codes: T67 (effects of heat and light), X30 (exposure to excessive natural heat), E86 (volume depletion), and E87 (other disorders of fluid, electrolyte, and acid-base balance). E86 and E87 are the ICD-10 codes for dehydration, which is statistically attributable to extreme heat. Thus, the dehydration codes are included to fully capture the effects of extreme heat.

** For each range of values presented, the smaller number represents the estimate based on the RCP4.5 scenario, and the larger number represents the estimate based on the RCP8.5 scenario.

Mental health ED visits expected to increase up to 133% in NY by 2050

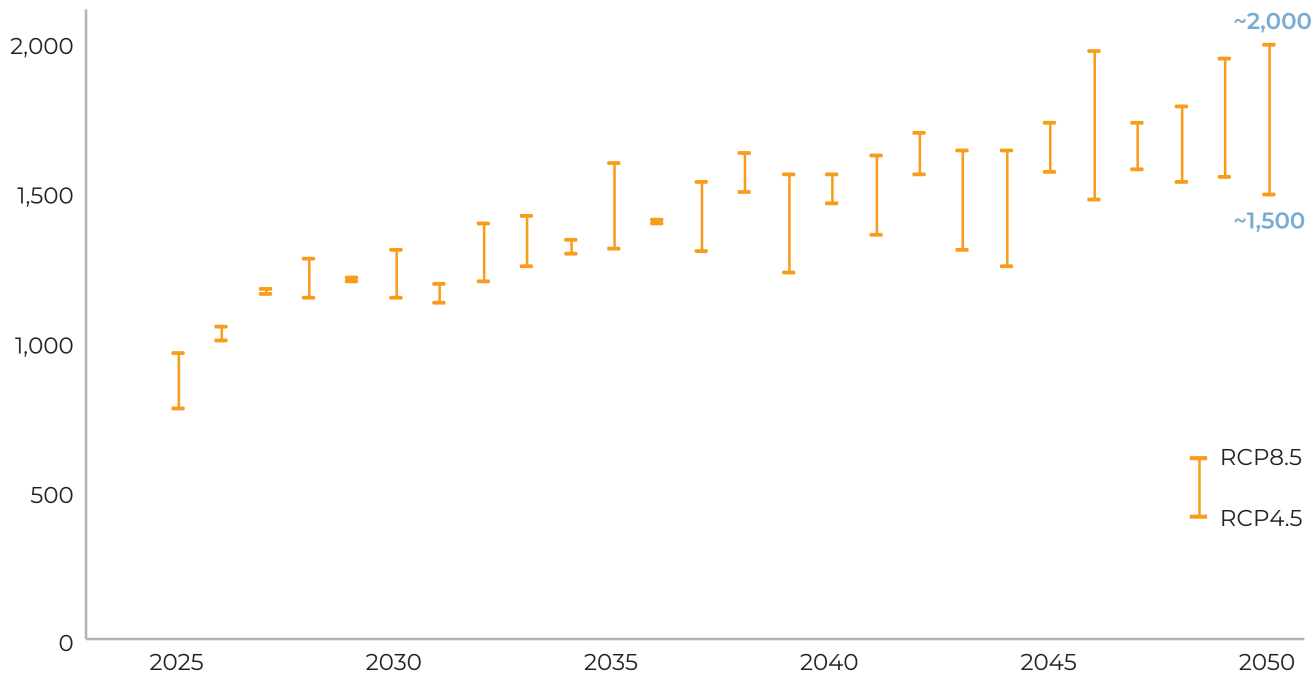
Individuals with existing mental health conditions may experience worsening symptoms during extreme heat days. Research shows that suicide rates can increase by over 4% during extreme heat and humidity[1] and that mental health-related ED visits increase on extreme heat days.[2] In New York State, the number of ED visits on extreme heat days for mental health conditions is projected to increase as much as 133%, from 860 visits in 2025 to 1,500 (RCP4.5 scenario) to 2,000 (RCP8.5 scenario) visits in 2050. Nationally, the increase is even more pronounced at up to 55%, resulting in 87,000 (RCP4.5 scenario) to 96,000 (RCP8.5 scenario) ED visits on extreme heat days for mental health conditions per year in 2050.

Climate change may also influence mental health in other ways. First, evidence implies that communities that have experienced extreme weather events have increased rates of anxiety and PTSD.[3] Second, studies suggest that exposure to hotter temperatures[4], increased precipitation[4], and poor air quality[5] can be associated with higher rates of anxiety and depression. Third, individuals may experience distress related to climate change and its potential future impacts, sometimes referred to as "eco-anxiety."[6]

Figure 11

Projected increase in ED visits on extreme heat days for mental health conditions in New York State, 2025 to 2050

Number of heat-related emergency department (ED) visits for mental health



This figure was generated by applying a multiplier defined in a literature source and doing a future projection using population projections and a climate model from the National Integrated Heat Health Information System. A full source list and explanation of the methodology can be found in the appendix.

SOURCES:

1. Florido Ngu, et al. "Correlating heatwaves and relative humidity with suicide." (2012)
2. Nori-Sarma, et al. "Association Between Ambient Heat and Risk of Emergency Department Visits for Mental Health Among US Adults, 2010 to 2019." (2022)
3. McLaughlin, et al. "Recovery from PTSD following Hurricane Katrina." (2011)
4. Obradovich, et al. "Empirical evidence of mental health risks posed by climate change." (2018)
5. Braithwaite, et al. "Air Pollution (Particulate Matter) Exposure and Associations with Depression, Anxiety, Bipolar, Psychosis and Suicide Risk: A Systematic Review and Meta-Analysis." (2019)
6. Ma, et al. "Climate change impacts on the mental health and wellbeing of young people: A scoping review of risk and protective factors." (2022)

NY has experienced 6 additional extreme precipitation days per year

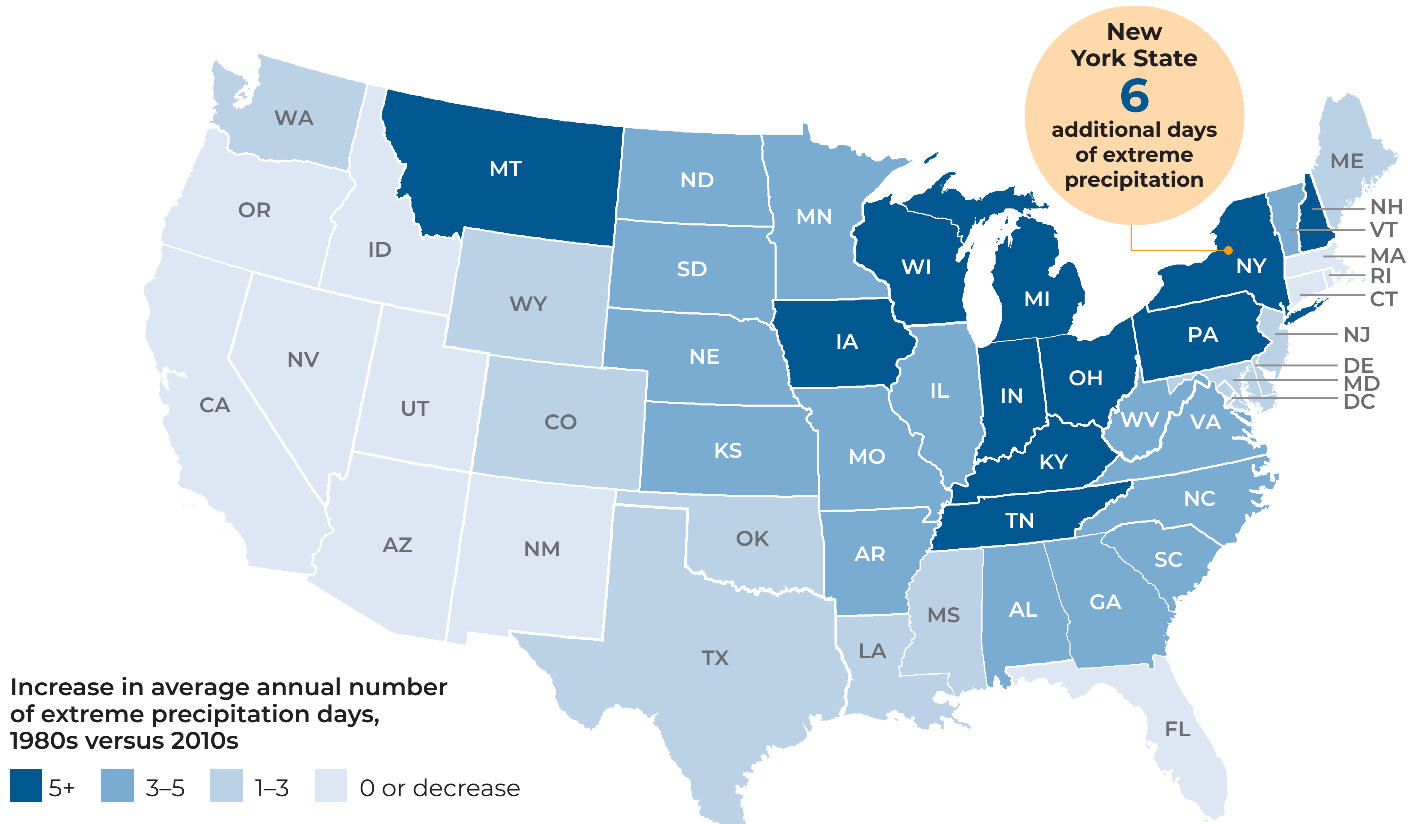
Extreme rainfall in the Northeastern U.S. has increased 71% since the 1950s, the sharpest rise of any region in the U.S.[1] In New York State, the average annual number of extreme precipitation days has increased by 6 when comparing the 1980s to the 2010s. Looking ahead, New York City is projected to experience a 4% to 11% increase in annual precipitation by 2050.[2]

Extreme precipitation events can trigger periods of intense flooding, with consequences that vary across the state. In upstate regions, heavier winter and spring rainfall has made upstate rivers like the Hudson and the Mohawk more prone to flooding.[3] Meanwhile, in New York City, flash floods can pose risks to the physical safety and overall livelihood of individuals living in basement apartments and may significantly affect the subway system.[4]

Another concern is sea level rise. Around New York City, sea levels are projected to rise 14 to 19 inches by 2050.[2] As a result, the number of residents living within the 100-year floodplain (an area that has a 1% chance of being flooded in any given year) is projected to nearly double to over 800,000.[5]

Figure 12

National map of extreme precipitation days, 1980s versus 2010s



This figure was generated using historical data from the Centers for Disease Control and Prevention's National Environmental Public Health Tracking Network data explorer.

SOURCES:

1. Huang, et al. "Total and extreme precipitation changes over the northeastern United States." (2017)
2. New York City Panel on Climate Change, "NPCC4: New York City climate risk information 2022—observations and projections." (2024)
3. New York State Energy Research and Development Authority, "Responding to Climate Change in New York State." (2011)
4. Zaveri, et al. "How the Storm Turned Basement Apartments Into Death Traps." (2021)
5. New York City Mayor's Office of Climate Resiliency, "Neighborhood Coastal Flood Protection Project Planning Guidance." (2021)

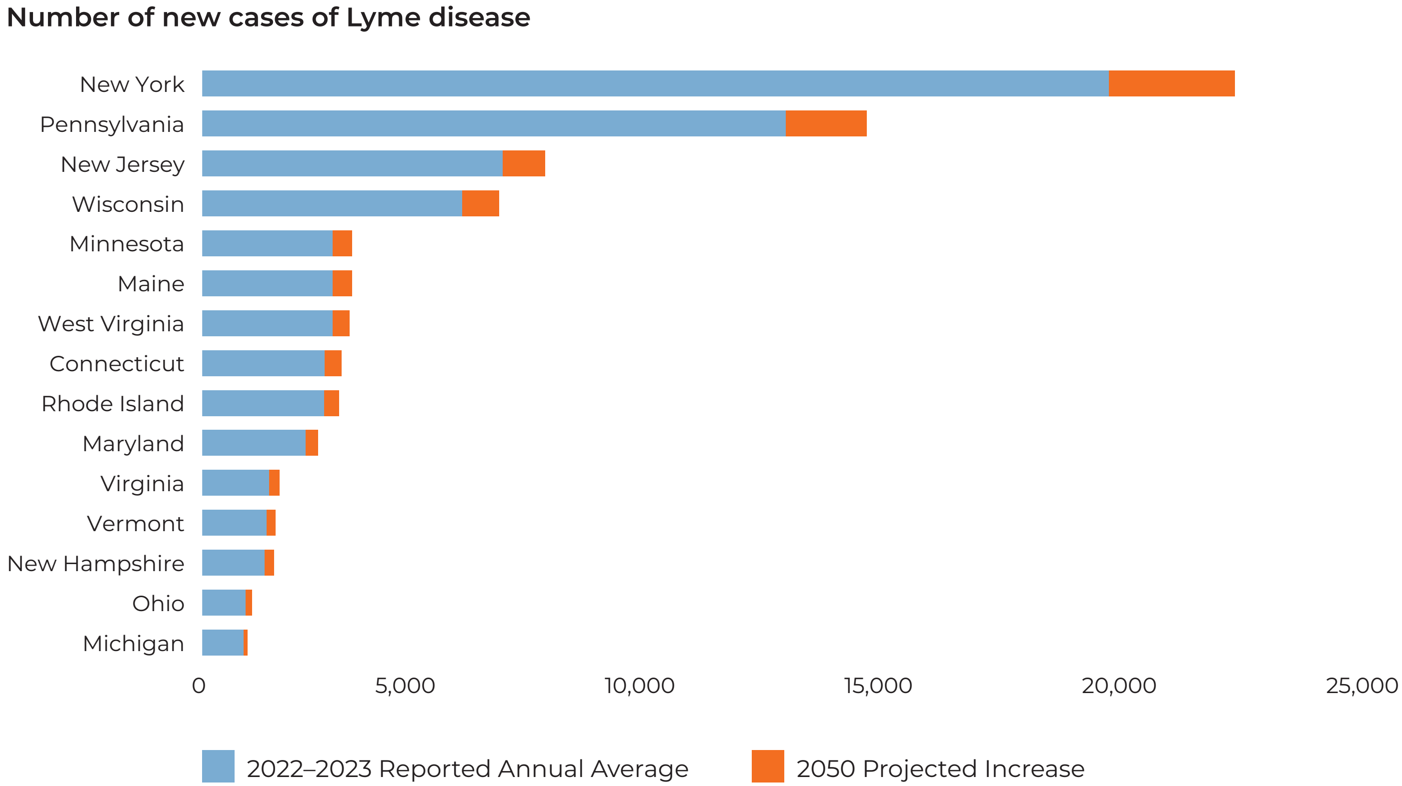
NY accounts for only 6% of the total population but represents 30% of Lyme disease incidence

Rising temperatures and increased precipitation may contribute to conditions that support the spread of disease-carrying vectors, such as mosquitoes, ticks, and fleas. Warmer temperatures may expand the geographic ranges with suitable temperature thresholds for vectors, accelerate vector development and virus replication rates, extend active seasons, increase biting frequency, and improve cold-season survival rates. Increased precipitation may provide better breeding conditions for mosquitoes, which can transmit diseases like Dengue, Zika, and West Nile Virus.[1] Research suggests that the number of Americans suffering from vector-borne diseases more than doubled from 2001 to 2023, with over 1 million cases reported in the U.S.[2]

Rising temperatures may extend the duration of tick season and the amount of time people spend outdoors, which could contribute to a higher likelihood of exposure to Lyme disease.[3] Nationally, Lyme disease incidence is projected to increase by 14% by 2050. A disproportionate share of the projected cases may occur in New York State, with an estimated 22,000 new cases in 2050.

Figure 13

Projected increase in Lyme disease incidence in New York State, 2022-2023 to 2050



This figure was generated by applying a multiplier defined in a literature source to historical data on Lyme disease incidence. A full source list and explanation of the methodology can be found in the appendix.

SOURCES:

1. EPA, Climate Change Indicators, Health and Society, West Nile Virus.
2. Centers for Disease Control and Prevention, "About Vector-Borne Diseases." (2024)
3. EPA, Climate Change Indicators, Health and Society, Lyme Disease.

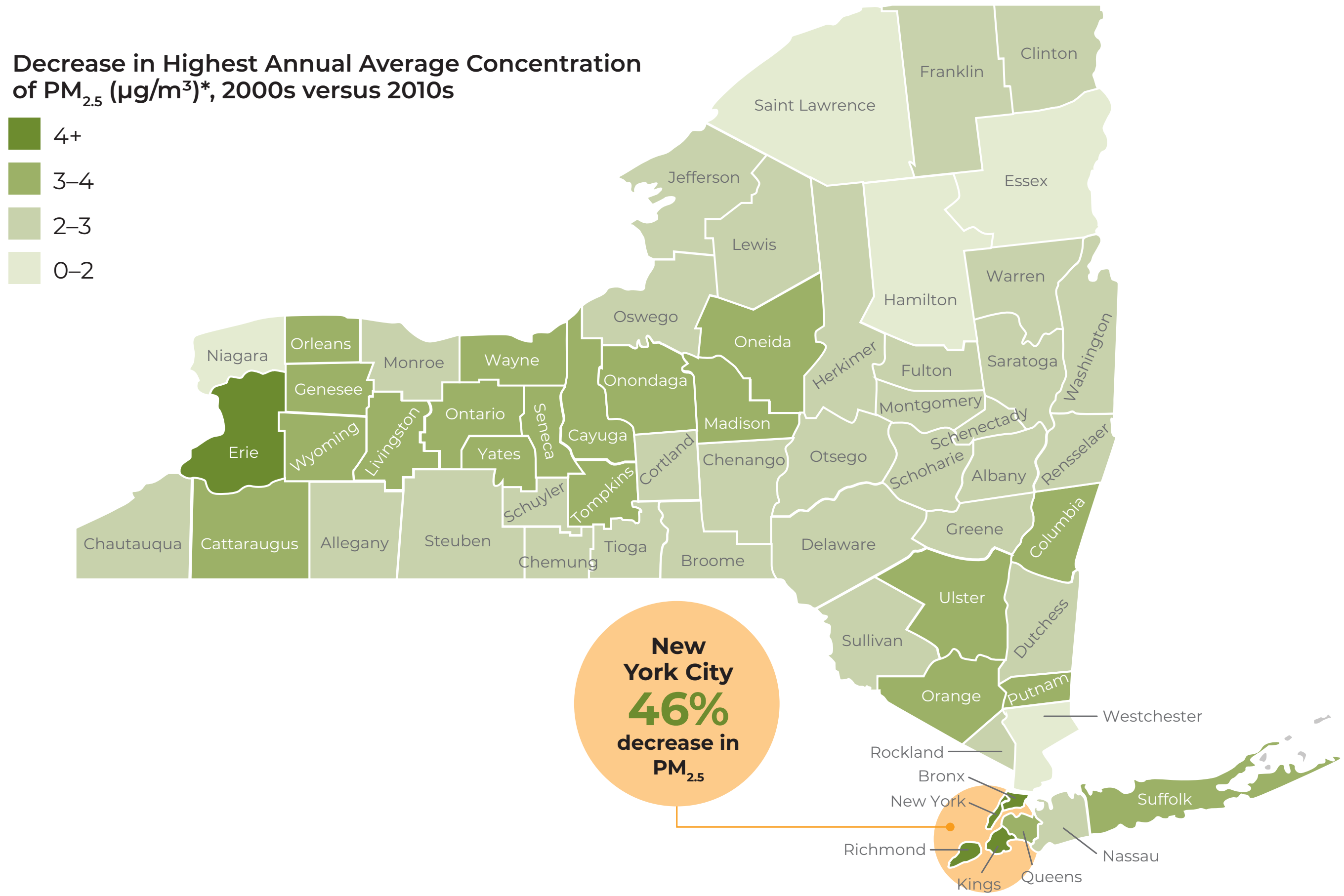
While air quality in NY has improved recently, extreme weather events like wildfires may affect this progress

In New York State, coordinated efforts to improve air quality have contributed to measurable progress. New York City in particular has seen improvement with initiatives like PlaNYC to phase out pollutants and identify and address hotspots. These initiatives complemented broader national efforts like the Clean Air Act of 1970 and its subsequent amendments in 1990.

However, the increasing frequency of wildfires may affect recent progress in air quality. Although wildfires are not projected to become significantly more frequent within New York State itself, the risk of wildfires in eastern Canada is increasing. In 2023, Canada experienced its most severe wildfire season on record, with over 15 million hectares burned.[1] At the height of these wildfires in June, smoke from eastern Canada caused $PM_{2.5}$ concentration in the Northeastern U.S. to hit 258.9 μg/m³, a number that exceeds the WHO standard guidelines by 17 times.[2] Moreover, climate change is estimated to have increased the likelihood of Canadian wildfires by a factor of 7 and their intensity by 50%, with 40% of the increase in intensity being potentially linked to human-induced climate change.[3]

Figure 14

New York State map of air quality, 2000s versus 2010s



This figure was generated using historical data from the Centers for Disease Control and Prevention's National Environmental Public Health Tracking Network data explorer.

SOURCES:

1. Jain, et al. "Drivers and Impacts of the Record-Breaking 2023 Wildfire Season in Canada." (2024)
2. Chen, et al. "Canadian record-breaking wildfires in 2023 and their impact on US air quality." (2025)
3. Barnes, et al. "Climate change more than doubled the likelihood of extreme fire weather conditions in eastern Canada." (2023)

NOTE:

* $PM_{2.5}$ stands for particulate matter with diameters that are generally 2.5 micrometers and smaller. This matter is a mixture of solid particles and liquid droplets found in the air, and due to its small size, it can be easily inhaled and get deep into the lungs or bloodstream.

Poor air quality may contribute to a higher risk of asthma in children

Inhalation of $PM_{2.5}$ can induce or worsen asthma by causing inflammation and damage in the lungs. In June 2023, when wildfire smoke from Canada caused $PM_{2.5}$ concentration to spike in New York City, asthma-related ED visits increased by 44%.[1] Asthma can also be induced by inhaling allergens. Climate-related factors may contribute to longer pollen seasons, higher concentrations of pollen and mold, and increased allergenic potential of pollen. Children are especially susceptible to developing asthma because their lungs are still developing and they breathe at a faster rate, which increases their exposure to airborne pollutants and allergens. Poor air quality and increased levels of allergens are projected to increase the number of childhood asthma diagnoses in the future, which may cause more childhood asthma-related ED visits. Of note, these health impacts are not felt evenly; in New York City, children in the Bronx have historically experienced heightened asthma risk, with rates of asthma hospitalization twice as high and asthma diagnoses nearly twice as high as the national rates.[2]

Figure 15

Projected childhood diagnoses, ED visits, and total cases for asthma in the U.S. and New York State, 2050

2050 Estimates*

	United States	New York State
New childhood asthma diagnoses attributed to climate triggers	~28,000 to ~36,000	~1,300 to ~1,800
Additional childhood asthma-related ED visits	~10,000 to ~13,000 with ~50% induced by air pollution and ~50% induced by allergens	~660 to ~840 with ~60% induced by air pollution and ~40% induced by allergens
Additional people living with asthma attributed to ozone and $PM_{2.5}$ exposure	~590,000 to ~680,000 cumulatively between 2025 and 2050	~26,000 to ~32,000 cumulatively between 2025 and 2050

This figure was generated by estimating historical numbers based on a literature source and doing a future projection using a climate projection from the World Bank.

SOURCES:

1. Goshua, et al. "The Role of Climate Change in Asthma." (2023)
2. Warman, et al. "Modifiable Risk Factors for Asthma Morbidity in Bronx Versus Other Inner-City Children." (2009)

NOTE:

* For each range of values presented, the smaller number represents the estimate based on the RCP4.5 scenario, and the larger number represents the estimate based on the RCP8.5 scenario.

Extreme heat and poor air quality are associated with adverse birth outcomes

Research suggests that extreme heat and poor air quality may be linked to certain adverse birth outcomes, including stillbirth and preterm birth, as well as low birth weight. Indeed, increased body temperature and inhalation of polluted air can interfere with placental blood flow and development, cause inflammation, and promote the formation of blood clots.

Figure 16

The impact of heat and air quality on birth outcomes

Heat and Birth Outcomes

3.7x

higher odds of stillbirth attributable to chronic heat exposure (>90th percentile heat days)[1]

2%

increase in the rate of preterm births following multi-day extreme heat[2]

1.3x

higher odds of low birth weight at higher versus lower heat exposure[3]

Air Quality and Birth Outcomes

30%

of stillbirths per year in the U.S. attributed to ozone exposure[4]

1.5x

higher odds of preterm birth with every interquartile range increase of $PM_{2.5}$ exposure[5]

80%

of U.S. studies found higher rates of low birth weight when air quality is poor[6]

SOURCES:

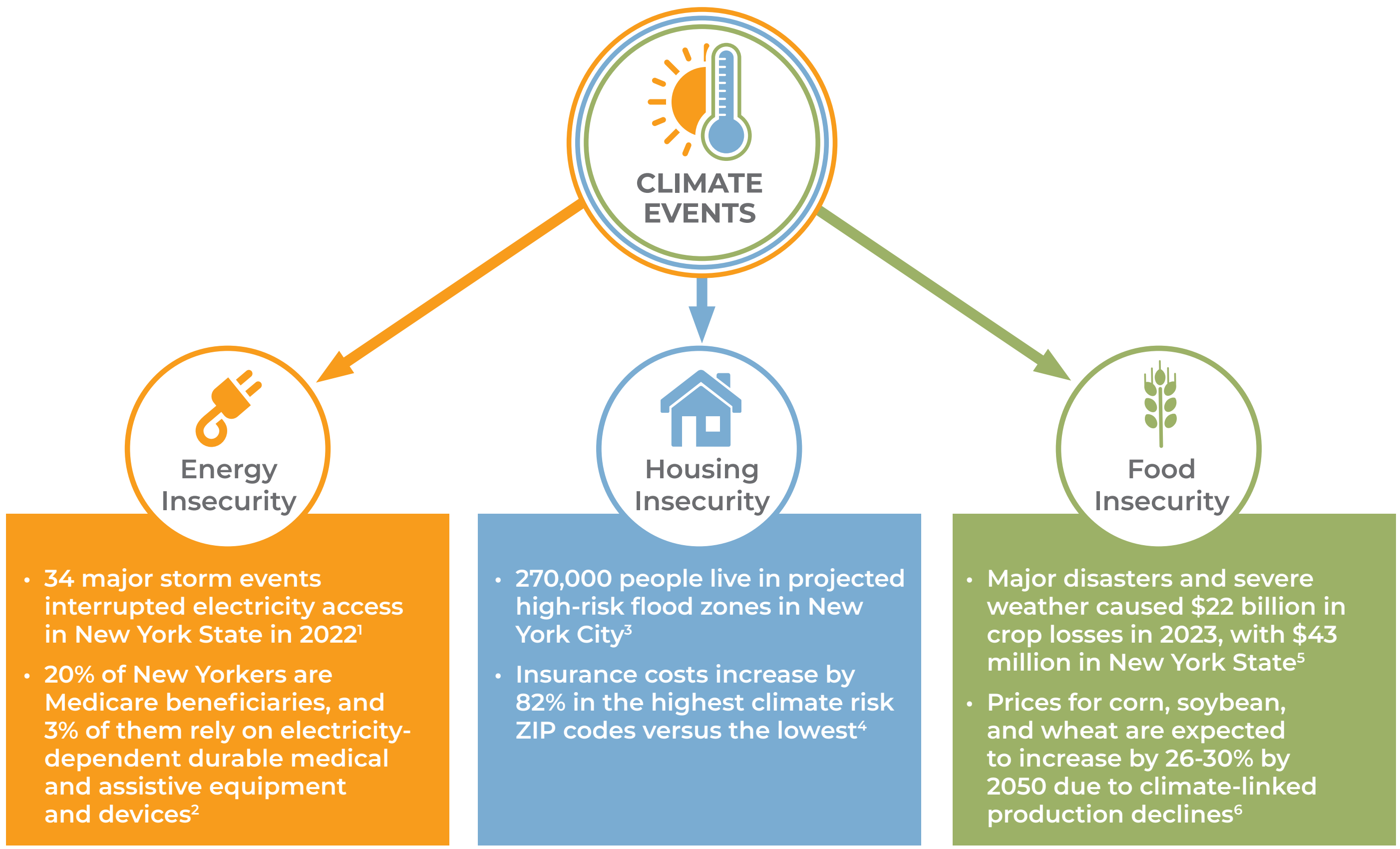
1. Ha, et al. “Ambient temperature and stillbirth: a multi-center retrospective cohort study.” (2017)
2. Darrow, et al. “Preterm and Early-Term Delivery After Heat Waves in 50 US Metropolitan Areas.” (2024)
3. Lakhoo, et al. “A systematic review and meta-analysis of heat exposure impacts on maternal, fetal and neonatal health.” (2025)
4. Mendola, et al. “Chronic and Acute Ozone Exposure in the Week Prior to Delivery Is Associated with the Risk of Stillbirth.” (2017)
5. Jiao, et al. “Fine Particulate Matter, Its Constituents, and Spontaneous Preterm Birth.” (2024)
6. Bekkar, et al. “Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US: A Systematic Review.” (2020)

Climate events are linked to housing insecurity, food insecurity, and energy insecurity

Beyond direct health outcomes, climate events may also indirectly influence health by affecting the social drivers of health. Extreme weather events can interrupt essential aspects of daily life that support health and well-being. For example, a severe storm may lead to flooding that can diminish access to stable housing and may cause power outages, which can interfere with the use of life-sustaining medical equipment. Climate events may also affect agricultural production and supply chains, potentially contributing to higher food prices and making access to nutritious food more difficult.

Figure 17

The impact of climate change on the social drivers of health



SOURCES:

1. New York State Department of Public Service, "2022 Electric Reliability Performance Report." (2023)
2. HHS's emPOWER Map.
3. Climate Central, "Coastal Flood Risk Across the U.S." (2025)
4. U.S. Department of the Treasury, "Analyses of U.S. Homeowners Insurance Markets, 2018-2022: Climate-Related Risks and Other Factors." (2025)
5. Munch, "Major Disasters and Severe Weather Caused Over $21 Billion in Crop Losses in 2023." (2024)
6. USDA's Climate Hubs, Fifth National Climate Assessment (NCA5) – U.S. Agriculture Highlights.

Climate change may cause long-term effects on the economy

Without further action to address climate-related risks, potential impacts may include increased costs for the health care system and reductions in workforce productivity or income. Projections suggest that the climate-related health events quantified in this analysis could lead to medical costs for the U.S. health care system of up to $45 billion in 2050. Additionally, excess heat may affect the ability to work safely, potentially resulting in up to $250 billion in lost wages across the U.S. in 2050. Exposure to excess heat conditions can occur indoors or outdoors and under a range of seasonal conditions, not only during heatwaves. To put these numbers in perspective, in New York State, the current combined costs of climate-related health events and lost wages due to excess heat are estimated to be two to three times higher than those associated with the flu. Collectively, these losses are projected to reduce year-over-year GDP growth by 10 to 12 basis points between 2025 and 2050.

Figure 18

Ripple effects of climate change on health care costs and wages in the U.S. and New York State, 2050

2050 Estimates (2050$)*

	United States	New York State
Annual health care costs attributable to climate-related health events	$40 to $45 Billion	$1.5 to $2 Billion
Annual lost wages due to excess heat	$200 to $250 Billion	$10 to $11.5 Billion

The annual health care costs were calculated by applying cost estimates from literature sources to the previously calculated projection estimates for various health conditions. The annual lost wages were calculated by applying wage estimates to potential lost labor hours defined in literature sources. The current economic burden of the flu was calculated by scaling down estimates of annual national medical losses from the flu based on literature sources to New York State and applying inflation adjustments to the current year. GDP losses were calculated using modeling based on historical nominal GDP growth. A full source list and explanation of the methodology can be found in the appendix.

NOTE:

* For each range of values presented, the smaller number represents the estimate based on the RCP4.5 scenario, and the larger number represents the estimate based on the RCP8.5 scenario.

Conclusion

Climate change poses wide-ranging risks to health through multiple pathways, including changes to temperature, precipitation, and air quality. In New York, health impacts have been felt unevenly, with older adults and Black New Yorkers experiencing disproportionately high heat-related mortality. These risks are further amplified for communities already facing socioeconomic challenges and individuals who are vulnerable (e.g., due to pregnancy, chronic health conditions, or environmental factors). A range of innovative initiatives are emerging to identify and address the health risks associated with extreme weather events and overall climate change. In addition to decarbonization, one of the key strategies to mitigate climate change, the following interventions offer examples of how to address near-term health impacts while also building long-term resilience and adaptive capacity. Further data collection and research will be important to deepen our understanding of evolving risks and identify the most appropriate solutions.

FOSTERING RESILIENCE AT THE COMMUNITY LEVEL

Resilience hubs are trusted community spaces that support people before, during, and after disasters. They serve as heating and cooling centers, provide power during outages, and offer temporary housing for those displaced by natural disasters. Although the New York City Housing Authority has begun to develop a network of resilience hubs in its developments, there is potential to expand these hubs in cultural and community spaces, such as churches, museums, event halls, and mixed-use buildings.

Boyle Heights Arts Conservatory is a Los Angeles community center that offers arts, media, and tech education to underserved groups. In 2024, it retrofitted its space to serve as a community resilience hub by utilizing its radio tower to connect residents with emergency services, operating a heating and cooling center, and providing shelter and electricity during natural disasters.

Resilience hub networks require active community involvement, grant funding, and clear implementation plans in order to successfully provide essential services during and after disasters and to foster broader community trust and safety.

INNOVATING TO ADDRESS THE SOCIAL DRIVERS OF HEALTH

Some states use Medicaid funds to help address social drivers of health. For example, the New York State Department of Health, through its 1115 Medicaid Waiver and Social Care Network program, supports Medicaid members by facilitating home improvements, providing transportation to social care appointments, and delivering nutritionally appropriate meals. Beyond Medicaid funding, hospitals can directly intervene to address their patients' social drivers of health.

Boston Medical Center's Clean Power Prescription trains health care providers to identify patients who may benefit from utility bill relief and help them reduce their costs by providing energy credits. These credits are generated by the hospital's installation of solar panels and are allocated to individual patient homes.

Programs like this can simultaneously help patients manage costs while reducing carbon emissions and costs for hospitals, but need upfront investments in renewable infrastructure and strong cross-sector partnerships to coordinate credit allocation and energy savings redistribution.

EDUCATING PROVIDERS, PATIENTS, & CARETAKERS

Since health care providers and health system staff have direct and frequent one-on-one interactions with patients, they are often viewed as trusted messengers. Hospitals could consider training staff to use these encounters to discuss a wide range of health-related issues, including the health impacts of climate change and extreme weather events.

NYC Health + Hospitals' (H+H) Climate Health Champions is a communications training program that helps hospital staff discuss the health effects of climate change with patients. The training outlines climate-related illnesses and raises awareness of emerging issues, such as heat-related illnesses, asthma, and vector-borne diseases.

This intervention is modeled after H+H's highly effective COVID-19 vaccine communications trainings but would benefit from regular updates as new data and research emerge, as well as integration into standard curricula and partnerships to support content development and dissemination.

Addressing climate-related health impacts calls for increased awareness and collaboration among a range of stakeholders, including community members, health professionals, and public leaders. In addition to long-term efforts to reduce emissions, there is a growing opportunity to respond to new risks, prioritize at-risk populations, and build resilience to future changes. This could involve cross-sector investment in practical, forward-looking solutions that can deliver both immediate benefits and long-term resilience, demonstrating that meaningful progress is both possible and achievable.

Appendix

1. Representative Concentration Pathways (RCP)

		RCP 4.5 **Moderate Emissions** Assumed trajectory based on existing trends	RCP 8.5 **High Emissions** Assumed trajectory in the absence of policies to manage climate change
Outcomes	Global warming by 2100	~2-3°C	~4-5°C
	Sea level rise	0.4 - 0.6m	0.6 - 1.0+m
	Extreme weather events	Noticeable increases	Severe increases
	Food and water security	Some stress	Wider-spread regional crises
Assumptions	Emissions	Moderate mitigation efforts lead to stabilization (emissions peak by midcentury)	Fossil fuel use remains high (emissions continue to rise through 2100)
	Policy	Implementation of some climate policies across globe	Minimal or absent climate policies
	Technological progress	Progress in energy transition and advances in other decarbonization technology development and adoption	Little progress in energy transition and advancement of decarbonization technology

2. Acronyms used in source lists

The following table contains a glossary of acronyms that are used in the source lists in the appendix.

CDC	Centers for Disease Control and Prevention
EPA	Environmental Protection Agency
FRED	Federal Reserve Economic Data
IHME	Institute For Health Metrics and Evaluation
NIHHIS	National Integrated Heat Health Information System
NOAA	National Oceanic and Atmospheric Administration
PAD	Program on Applied Demographics

3. Source list and methodology for figures

FIGURES 6 AND 7

Sources

- Weinberger, et al. “Estimating the number of excess deaths attributable to heat in 297 United States counties.” (2020)
- Zhao, et al. “Global, regional, and national burden of mortality associated with non-optimal ambient temperatures from 2000 to 2019: a three-stage modelling study.” (2021)
- Lee, et al. “Future temperature-related deaths in the US: The impact of climate change, demographics, and adaptation.” (2023)
- Khatana, et al. “Association of extreme heat with all-cause mortality in the contiguous US, 2008-2017.” (2022)
- The NYC Environment & Health Data Portal, “2024 NYC Heat-Related Mortality Report.” (2025)
- CDC WONDER, Multiple Cause of Death
- IHME GBD Data, Risk = High Temperatures
- IHME GBD Data, Diseases (DALY estimates)
- US Census Bureau, Age and Sex Composition in the United States, Table 1, 2017-2021
- FRED, Population, Total for the United States; FRED, Resident Population in New York; FRED, Resident Population in Bronx, New York, Kings, Queens, and Richmond Counties, NY
- New York State Department of Health, Vital Statistics of New York State, Table 1, 2017-2021
- US Census Bureau, 2023 National Population Projections Tables: Main Series, Table 3
- Cornell PAD, New York State projections 2022-2050, Middle Scenario
- Salvo, et al. “New York City Population Projections by Age/Sex & Borough, 2010-2040.” (2013)
- Cornell PAD, County Projections Explorer, Bronx, New York, Kings, Queens, and Richmond Counties
- NIHHIS, The Climate Explorer

Methodology

First, baseline estimates over the time period of 2017 to 2021 were calculated for the U.S., New York State, and New York City. For the national baseline estimate, five separate literature and data sources that contained historical estimates of heat-exacerbated deaths in the U.S. were triangulated. For New York City, the estimate of heat-exacerbated deaths in New York City annually from 2017 to 2021 cited in the New York City Heat Mortality Report was pulled. For New York State, a bottom-up approach was used to scale up the New York City estimate, and a top-down approach was used to scale down the U.S. estimate. Then, the average of the two estimates was taken, with heavier weighting for the bottom-up approach since it is assumed that local knowledge has a higher level of accuracy. Then, in order to disaggregate the estimates for heat-exacerbated deaths in 2017 to 2021 by age, the share of heat-exacerbated deaths for each age category was derived from historical CDC WONDER data on age-disaggregated direct heat death. Finally, population projections and an NIHHIS climate model were applied to generate projections for the future.

3. Source list and methodology for figures *(continued)*

FIGURE 8

Sources

- Tran, et al. "Extreme temperature increases the risk of COPD morbimortality: A systematic review and meta-analysis." (2025)
- Khatana, et al. "Projected Change in the Burden of Excess Cardiovascular Deaths Associated With Extreme Heat by Midcentury (2036-2065) in the Contiguous United States." (2023)
- CDC WONDER, Multiple Cause of Death
- US Census Bureau, 2023 National Population Projections Tables: Main Series, Table 3
- Cornell PAD, New York State projections 2022-2050, Middle Scenario, Age 25+
- NIHHIS, The Climate Explorer

Methodology

For COPD, historical CDC data on the rate of COPD deaths was adjusted to remove heat-attributable cases so that it could be combined with the increase in relative risk for COPD morbidity per extreme heat day that was pulled from the literature. Then, population projections for New York State and the U.S. and an NIHHIS climate model were applied to generate projections for the future.

For CVD, the increase in average annual CVD deaths in the U.S. from 2008 to 2019 was pulled from the literature and then extrapolated to project the number of heat-attributable CVD deaths in the U.S. in 2050. This number was scaled down to localize to New York State using the previously calculated ratio of overall projected heat-exacerbated deaths in 2050.

FIGURE 10

Sources

- Sun, et al. "Ambient heat and risks of emergency department visits among adults in the United States: time stratified case crossover study." (2021)
- Finkelstein, et al. "The Oregon Health Insurance Experiment: Evidence from the First Year." (2012)
- Dring, et al. "Emergency Department Visits for Heat-Related Emergency Conditions in the United States from 2008-2020." (2022)
- US Census Bureau, Age and Sex Composition in the United States, Table 1, 2017-2021
- New York State Department of Health, Vital Statistics of New York State, Table 1, 2017-2021
- FRED, Population, Total for the United States; FRED, Resident Population in New York; FRED, Resident Population in Bronx, New York, Kings, Queens, and Richmond Counties, NY
- US Census Bureau, 2023 National Population Projections Tables: Main Series, Table 3
- Cornell PAD, New York State projections 2022-2050, Middle Scenario, Age 25+
- Cornell PAD, County Projections Explorer, Bronx, New York, Kings, Queens, and Richmond Counties
- Salvo, et al. "New York City Population Projections by Age/Sex & Borough, 2010-2040." (2013)
- Tran, et al. "Extreme temperature increases the risk of COPD morbimortality: A systematic review and meta-analysis." (2025)
- CDC, National Environmental Public Health Tracking Network, Data Explorer
- NIHHIS, The Climate Explorer

3. Source list and methodology for figures *(continued)*

FIGURE 10 *(continued)*

Methodology

For heat-related illnesses, the excess attributable risk of ED visits associated with extreme heat days for Medicare beneficiaries was pulled from the literature and combined with an adjustment rate from a different literature source to generalize the findings to the broader U.S. population. Population projections for the U.S. and an NIHHIS climate model were applied to generate projections for the future. For New York State, the calculated risk factor was localized to New York State based on literature and data sources, which was then combined with population projections for New York State and an NIHHIS climate model.

For COPD, historical CDC data on the rate of COPD ED visits in the United States and New York State excluding those due to heat was combined with the increase in relative risk for COPD morbidity per extreme heat day that was pulled from the literature. Then, population projections and an NIHHIS climate model were applied to generate projections for the future.

FIGURE 11

Sources

- Nori-Sarma et al., "Association Between Ambient Heat and Risk of Emergency Department Visits for Mental Health Among US Adults, 2010 to 2019." (2022)
- Cornell PAD, New York State projections 2022-2050, Middle Scenario, Age 20+
- CDC, National Environmental Public Health Tracking Network, Data Explorer
- NIHHIS, The Climate Explorer

Methodology

Historical CDC data on the rate of mental health ED visits in the United States and New York State excluding those due to heat was combined with the increase in relative risk for mental health ED visits per extreme heat day that was pulled from the literature. Then, population projections and an NIHHIS climate model were applied to generate projections for the future.

FIGURE 13

Sources

- Dumic, et al. "'Ticking Bomb': The Impact of Climate Change on the Incidence of Lyme Disease." (2018)
- World Bank Group, Climate Change Knowledge Portal
- Kugeler, et al. "Surveillance for Lyme Disease After Implementation of a Revised Case Definition — United States, 2022." (2024)
- CDC, Lyme Disease Case Maps

Methodology

The projected increase in Lyme disease cases by midcentury versus the baseline from 2000 to 2016 was pulled from the literature and corrected to account for the CDC's change in definition for Lyme disease surveillance in 2022. This percent increase was then combined with CDC historical data on the average annual number of Lyme disease cases reported in New York State in 2022-2023 to calculate the estimated number of Lyme disease cases in New York State in 2050 and the number of excess Lyme disease cases due to increased temperatures in 2050.

3. Source list and methodology for figures *(continued)*

FIGURE 15

Sources

- EPA, "Climate Change and Children's Health and Well-Being in the United States." (2023)
- World Bank Group, Climate Change Knowledge Portal

Methodology

First, data was pulled from the EPA that estimates the number of new childhood asthma diagnoses, the number of additional asthma-related childhood ED visits, and the cumulative number of additional people living with asthma, attributable to air pollutants at different degrees of global warming in the U.S. Then, a regression formula relating the average temperature change to these numbers was defined. Finally, a climate projection from the World Bank was applied to generate projections for the future.

FIGURE 18

Sources

- Woolf, et al. "The Health Care Costs of Extreme Heat." (2023)
- CDC, Most Recent National Asthma Data
- New York City Department of Health and Mental Hygiene, Epi Data Briefs and Data Tables, Mental Health Emergency Department Visits among New York City Adults, 2015
- Mannino, et al. "National and Local Direct Medical Cost Burden of COPD in the United States From 2016 to 2019 and Projections Through 2029." (2024)
- New York State Department of Health, Environmental Public Health Tracker, Heat Stress
- KFF, Health Care Expenditures per Capita by State of Residence
- Perry, et al. "The Economic Burden of Pediatric Asthma in the United States: Literature Review of Current Evidence." (2019)
- Zaraca, et al. "Costs of Emergency Department Visits for Mental and Substance Use Disorders in the United States, 2017." (2020)
- Schmeltz, et al. "Economic Burden of Hospitalizations for Heat-Related Illnesses in the United States, 2001-2010." (2016)
- Lin, et al. "Excessive heat and respiratory hospitalizations in New York State: estimating current and future public health burden related to climate change." (2012)
- Stensland, et al. "An examination of costs, charges, and payments for inpatient psychiatric treatment in community hospitals." (2012)
- Hook, et al. "Economic Burden of Reported Lyme Disease in High-Incidence Areas, United States, 2014–2016." (2022)
- FRED, Consumer Price Index for All Urban Consumers: Medical Care in U.S. City Average
- Romanello, et al. "The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action." (2024)
- US Census Bureau, 2023 National Population Projections Tables: Main Series, Table 3
- World Bank Group, Climate Change Knowledge Portal
- U.S. Bureau of Labor Statistics, Employment Cost Index: Wages and Salaries: Private Industry Workers, retrieved from FRED, Federal Reserve Bank of St. Louis

3. Source list and methodology for figures *(continued)*

FIGURE 18 *(continued)*	**Sources *(continued)***
	• NOAA, National Centers for Environmental Information, National Climate Report, January 2020-December 2024 • NOAA, National Centers for Environmental Information, Statewide Rankings, Average Temperature, New York, January 2023-December 2024 • Putri, et al. "Economic burden of seasonal influenza in the United States." (2018) • Molinari, et al. "The annual impact of seasonal influenza in the US: measuring disease burden and costs." (2007) • CDC FluView Interactive, National, Regional, and State Level Outpatient Illness and Viral Surveillance • FRED, Gross Domestic Product: All Industry Total in New York, Millions of Dollars, Annual, Not Seasonally Adjusted
	Methodology
	For health care costs, the previously calculated projection estimates for ED visits (heat-related illnesses, COPD, asthma, and mental health), hospitalizations (heat-related illnesses, COPD, asthma, and mental health), and chronic illnesses (Lyme disease, asthma) in the U.S. in 2050 were quantified into costs based on estimates from the literature. Then, a physician-fee adjustment and inflation adjustment were applied to calculate the total annual excess health care expenditures due to climate change in 2050. For New York State, the New York State projection estimates were used, and an additional New York State cost adjustment was applied. For lost wages, the number of potential labor hours lost due to heat in the U.S. in 2022 and the percent increase in hours lost over the previous two decades were pulled from the literature. Then, historical World Bank data on the change in temperature over that two-decade period was used to calculate the percent increase in hours lost per 1°C of warming, after which climate projections were applied to estimate the projected number of hours lost in 2050. Finally, national wage estimates were applied with a heavier weighting for construction, manufacturing, services, and agriculture to estimate lost wages in 2050. For New York State, an additional adjustment for the average temperature differential between the U.S. and New York State was applied, and the wage estimates for the same industries in New York State were used. For GDP losses, a baseline was established using historical nominal GDP growth for New York State from 1997 to 2024. Then, the previously calculated projected health care costs and lost wages were used to model a gradual increase in economic losses from 2025 to 2050 under both climate scenarios, resulting in adjusted GDP projections. The baseline was compared to the two climate scenarios to estimate the reduction in GDP growth, measured by percentage points, by 2050. For the current economic burden of the flu, two literature sources were used to estimate annual national medical and indirect losses from the flu in 2003 and 2015. Then, an inflation adjustment was applied to calculate the economic burden of the flu in 2025 before scaling the 2025 cost estimate down to New York State by using the total number of flu visits counted in 2024-2025 in the U.S. and New York State. The cost was finally adjusted for increased health care costs and wages in New York State.

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